

REMARKS

Present Status of the Claims

Claims 1, 3-7, 9-12, 14, 16-20, 22-25 are pending after entry of the amendment. Claims 2, 8, 13, 15, 21 and 26 were previously cancelled.

Claims 1 and 14 have been amended to recite that the carbon nanocapsule thin film has no metal material between the carbon nanocapsules. Support thereof can be found in the Embodiment of the original specification. Specifically, there is no metal material present in the electroplating solution such that the carbon nanocapsule thin film has no metal material between the carbon nanocapsules. Thus, Applicants respectfully submit that no new matter has been added.

Reconsideration of the application, as amended, is respectfully requested.

Interview Summary

Applicants would like to thank the Examiner and the Primary Examiner for the time during the interview on June 16, 2010. During the interview, the Examiners stated that the amendment to claims 1 and 14 would be acceptable, but additional searching might be necessary.

Issues under 35 U.S.C. 103 (a)

Claims 1, 3-7, 9-12, 14, 16-20 and 22-25 stand rejected under 35 U.S.C. 103(a) as being anticipated by Nakamoto (US 2002/0060514), Ruoff et al (US 5547748), Lieber et al (US 6159742) and Iwamura et al (US 2002/0061397). This rejection is respectfully traversed.

The Present Invention

Claim 1 of the present invention is directed to a carbon nanocapsule thin film, prepared by electroplating a plurality of carbon nanocapsules onto a substrate, wherein the carbon

nanocapsules comprise a functional group and the functional group carries at least one charge after dissociation, and the carbon nanocapsule is a polyhedral carbon cluster constituted by having concentric multi-layers of closed graphitic sheet structure and the diameter of the carbon nanocapsule is about 3-100 nm, and the carbon nanocapsules thin film has no metal material between the carbon nanocapsules.

Claim 14 of the present invention is directed to a carbon nanocapsule thin film preparation method, comprising: providing a substrate; and electroplating a plurality of carbon nanocapsules onto the substrate, wherein the carbon nanocapsules comprise a functional group and the functional group carries at least one charge after dissociation, the carbon nanocapsule is a polyhedral carbon cluster constituting multiple graphite layers having a balls-within-a ball structure, and the diameter of a carbon nanocapsule is 3-100 nm, and wherein the carbon nanocapsules thin film has no metal material between the carbon nanocapsules.

Distinctions over the Cited References

Nakamoto, Ruoff, Lieber and Iwamura fail to disclose or suggest that the carbon nanocapsule thin film has no metal material between the carbon nanocapsules.

Independent claims 1 and 14 require at least the feature that the carbon nanocapsule thin film has no metal material between the carbon nanocapsules.

As disclosed in the Embodiment of page 6 of the present specification, the functionalized carbon nanocapsules are dispersed or dissolved into the electroplating solution to form charged functionalized carbon nanocapsules and then the charged functionalized carbon nanocapsules are electroplated onto the silver anode to form the carbon nanocapsule thin film. Because the carbon nanocapsule thin film of the present invention is formed by electroplating the charged functionalized carbon nanocapsules onto the silver electrode, there is no requirement of metal materials for electroplating process. Also, according to the Embodiment of the present specification, there is no metal material added into the electroplating solution. Therefore, the carbon nanocapsule thin film of the present invention is formed without metal materials mixing between the carbon nanocapsules.

Moreover, as disclosed at page 7 of the present specification, the carbon nanocapsule thin film on the silver electrode is not degraded after placing in royal water for 1 minute. Accordingly, the present carbon nanocapsule thin film has a good chemical resistivity to protect the metal thereunder. However, if metal materials are mixed between the carbon nanocapsules of a carbon nanocapsule thin film, the chemical resistivity of the carbon nanocapsule thin film would be reduced.

In addition, as recited in claim 4 of the present invention, the carbon nanocapsule is a metal-filled carbon nanocapsule filled with metals, metal oxides, metal carbides, or alloys. Since the carbon nanocapsule has multilayered polyhedral shells of carbon, the metals, metal oxides, metal carbides or alloys are disposed in the inner of the carbon nanocapsule, not mixing between the carbon nanocapsules.

However, Nakamoto's thin film of the emitter essentially includes the metal plating layer and the carbon nanotubes. See claim 1, the following paragraph [0064] and FIGS. 3-5 of Nakamoto.

[0064] The electroless plating process was performed for about 3 minutes. ... During this plating process, the fullerenes or carbon nanotubes for forming the micro-bodies 44 precipitated together with the plating material. Thus, the metal plating layers 42 and 46 were formed with the micro-bodies 44 being buried in them in a dispersed state.

That is, the fullerenes or carbon nanotubes of Nakamoto for forming the micro-bodies 44 and 48 are precipitated together with the metal plating layers 42 and 46 by a metal reduction of the metal plating layer during an electroplating process to form the emitters for a filed emission cold cathode device. Accordingly, a thin film of the emitter of Nakamoto essentially includes the metal plating layer and the carbon nanotubes.

Moreover, the emitter of Nakamoto requires the metal plating layer to enhance the conductivity of the thin film having the carbon nanotubes therein for the filed emission cold cathode device, such that the thin film of Nakamoto needs the metal plating layer mixing with the carbon nanotubes.

Indeed, Nakamoto fails to disclose or suggest a carbon nanocapsule thin film without metal materials between the carbon nanocapsules.

Also, the deficiencies of Nakamoto cannot be cured by Ruoff, Iwamura and Lieber since these references also fail to disclose or suggest a carbon nanocapsule thin film without metal materials between the carbon nanocapsules. In summary, all of the Nakamoto, Ruoff, Iwamura and Lieber references on the record does not disclose or suggest the feature of “the carbon nanocapsules thin film has no metal material between the carbon nanocapsules” recited in claims 1 and 14 of the present invention. Applicants therefore believe that claims 1 and 14 are novel and non-obvious over Nakamoto, Ruoff, Iwamura and Lieber.

Insofar as claims 3-7 and 9-12 as well as claims 16-20 and 22-25 depend from claims 1 and 14, respectively, these claims are also allowable at least by virtue of their dependency.

Conclusion

Applicants believe that this application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Craig A. McRobbie, Registration No. 42,874 at the telephone number of the undersigned below to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

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Respectfully submitted,

By 

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